The Sewanee PLANT PRESS

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Students Examine Changing Plant-Pathogen Interactions on the Domain

Over the years, students in my Ecology classes have conducted independent projects that have explored the changing dynamics of plant communities on the Domain. This year my students followed up on some older studies and established some new ones as a baseline for future change. A focus this year was on plant-pathogen interactions.

By the mid-1990s, the Domain, along with the rest of the Southern Appalachians, had experienced a major decline in flowering dogwood because of the spread of a lethal introduced fungus, *Discula destructiva*. Kevin Hiers '96 and I published a paper in *Conservation Biology* in 1997 that documented the decline of dogwoods on the Domain and we were among the first to speculate on the ecological consequences of this devastating blight in southeastern forests.

We hypothesized that dogwoods represented a foundation species whose loss could have a major bottom-up trophic cascade effect within the forest ecosystem. We predicted that since dogwoods promoted calcium availability in the soil, the loss of dogwoods would mean lower calcium availability for soil invertebrates and ultimately for female songbirds that require large amounts of calcium during spring egg production.

Since the publication of this paper, research from other forest ecosystems in the southeast has confirmed many of these conclusions. The good news is that dogwood did not go locally extinct as originally feared. This spring my Ecology students went back and resurveyed the transects in Dick's Cove that Kevin and I used for the original study in the 1990s. We found that while dogwoods had continued to decline after our study, they seem now to be maintained at a low but persistent density within the forest. It is unlikely, however, that dogwood will ever again be the king of the understory, filling our coves with their white springtime displays.

In Shakerag Hollow this spring, we were interested in seeing if the early warming in March would have an effect on plant-pathogen interactions among understory herb species.

Mayapples are iconic spring wildflowers with large umbrella-like leaves that spread underground via rhizomes and form large clonal populations. Mayapple populations are infected each year by a host-specific rust fungus (*Puccinia podopylli*) that has two stages. The first stage is manifest early as orange necrotic leaf lesions. The spores produced by this first stage are wind dispersed and usually re-infect the leaves with black lesions right before the leaves senesce. Spores from these black lesions overwinter in the soil and re-infect emerging leaves the following spring.

Students in my Ecology class showed that there was widespread infection of the mayapple populations with black lesions well in advance of leaf senescence this spring. Such interference with the photosynthetic area of the leaves may have resulted in a major reduction of the net carbon gain by these plants.

The timing of carbon gain is critical to vernal wildflowers. Species such as mayapple have a narrow window for carbon acquisition in the spring between the time their leaves unfurl and when the canopy closes overhead, effectively blocking their light. This is the only time that they have to produce and store the food they need to survive dormancy and then be able to produce next year's shoots.

The early March warming this spring had the effect of speeding up a number of processes such as early canopy closure and pathogen virulence that may have altered the carbon budget of mayapples this year. Future classes will be following up on this baseline study to see if the pattern is repeated in coming years. Unpredictable weather, such as we experienced this spring, is one of the many hypothesized consequences of global climate change. The impact that changing weather regimes will have on the web of species interactions in our forests is part of the myriad of ecological uncertainties we face as we continue to dump greenhouse gases into our atmosphere.

— Jon Evans

SEI Effort Key in Battle Against the Hemlock Woolly Adelgid

This winter's discovery of the hemlock woolly adelgid (HWA) on the Domain has brought the dreaded infestation to our doorstep. Accidentally introduced in Virginia in 1951, this tiny aphid-like insect has slowly but steadily increased its range, devastating great hemlocks in its path. Giants of the Blue Ridge and the Smokies have shown no resistance to the HWA. It is estimated that 90% of the hemlocks in the Shenandoah Valley, where the Asian import was first introduced in North America, have been killed.

In anticipation of the arrival of this pest on the South Cumberland Plateau and as an integral component of the effort to combat it, Nick Hollingshead, then with the Sewanee Environmental Institute, worked with a team of students to map the hemlocks in our neighboring 13,760-acre Savage Gulf State Natural Area. He estimated that the Savage Gulf contains nearly 32,000 hemlocks in the mid- and upper canopy. It would be impossible to treat all of the trees, but based on the research, the State of Tennessee adopted a treatment plan, which is now being carried out. They are inoculating all hemlocks within 150 feet of major streams and trails for the purpose of protecting important riparian habitat and recreational values.

That pilot mapping program has led to much bigger things. Hollingshead has gone on to help the Tennessee Nature Conservancy, Tennessee state agencies, and the National Park Service with their HWA strategies. To date he has analyzed hemlock populations on approximately 310,000 acres of the 530,000 or so acres of state and federal land in the plateau region of TN. "Before this mapping work, there really was no good data resource for conservation planning support. The agencies are now beginning to use this data to identify sites for conservation," Hollingshead commented. "The most important values we are trying to protect by treating these sites for HWA, beyond saving the species, are ecological, recreational, and horticultural."

For more information on the SEI and its work, see http://sei.sewanee.edu/

— MPP

American Chestnuts Planted on the Domain

On a sunny morning in early June, several members of the Sewanee community — including faculty staff, students, and alums — joined representatives from The American Chestnut Foundation (TACF) to plant four potentially blight-resistant American chestnut seedlings in the Sewanee forest. They are now growing in a portion of "Compartment 20" where Forestry professor Ken Smith is conducting a forest restoration project.

Before the arrival of *Diaporthe parasitica* Murrill, the Asian fungus that caused the chestnut blight, the American chestnut (*Castanea dentata* (Marsh.) Borkh.) may have comprised 30% of the canopy on the Domain. Those trees were fast-growing and massive, reaching heights of 100 feet and diameters of five to six feet. And they were prolific producers of large nuts, making the chestnut a nutritional mainstay for humans as well as forest animals.

Dr. Hill Craddock, biology professor at the University of Tennessee at Chattanooga, heads the Chattanooga Chestnut Tree Project. He grew the seedlings from chestnuts that he planted this spring. Each of the plants is now about a foot tall and is labeled with a tag identifying its mother plant, the orchard and block where that tree was grown, and the individual seedling itself. And each is the result of several generations of backcrossing American chestnut trees with American-Chinese chestnut hybrids. Each successive backcrossing reduces the percentage of Chinese chestnut genes in the progeny by 50%. The objective is to produce trees that have most of the characters of the American chestnut, while retaining the Chinese chestnut's greater resistance to the blight.

With sunshine, a little water and fertilizer, fencing to protect them from the deer, and a lot of luck, one or two of the seedlings planted this summer just might grow to reach the forest canopy that their predecessors dominated a hundred years ago. But TACF Regional Science Coordinator Thomas Saielli would like to see Sewanee do a progeny test, using seed from TACF sown directly into the ground on the Domain. Data from such a planting would add to the body of knowledge that TACF is compiling and contribute to the foundation's ultimate goal of returning the American chestnut to its original range.

For more on forest restoration projects on the Domain, contact Prof. Smith at ksmith@sewanee.edu. To learn more about The American Chestnut Foundation, see <www.acf.org/>.

— MPP

Summer Calendar of Events

Nature Journaling Opportunity
9:00–11:00 AM Thursdays, June 6 through July, Mary Priestley

Experienced in but not an "authority" on nature journaling, Mary has been practicing it for about ten years. This is not a workshop. Rather, it is an invitation to set aside any or all Thursday mornings in June and July for nature journaling. Meet at the gazebo in Abbo's Alley. Bring a notebook (preferably small and unlined), a pen or pencil, and something to sit on if you wish. Come as early or as late as you like and stay for however long you like.

Trees of the Sewanee Campus
Tues., June 19, 4 PM, George Ramseur

Join botany professor *emeritus* Dr. Ramseur for a walk among the trees of the Sewanee campus. He has lived with and taught about these trees for many years. Meet in front of All Saints' Chapel for this easy one-hour walk. For background reading, see *Comparative Descriptions of the Native Trees of the Sewanee Area,* by Stephen Puckette with Mary P. Priestley, Karen Kuers, and Thomas O. Hay, 1996, The University of the South Press, available at the University Bookstore.

Cross Trails
Tues., July 3, 4 p.m. Yolande Gottfried

Several trails branch off from the War Memorial Cross. We will take short forays in the most interesting directions, as well as talk about the trees and other plants near the Cross itself. Meet at the Cross (at the end of Tennessee Avenue) for this moderate one-hour walk.

Nature Drawing and Journaling
August 10, 11, 9 AM–3 PM Lendon Noe

"Drawing Lessons From Nature" is a two-day workshop on techniques for focusing attention, drawing from nature, and recording your observations. Cost: $75. Enrollment is limited to 15. See article elsewhere in this newsletter.

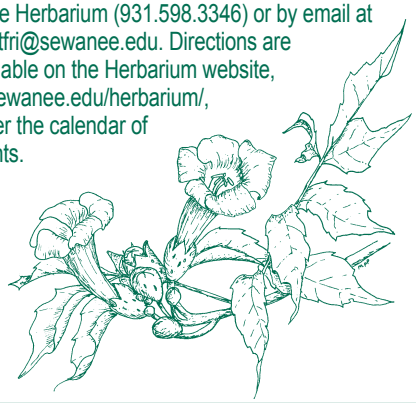
Mountain Goat Trail
Sat., August 25, 9 AM, Mary Priestley

Explore the newest section of the Mountain Goat Trail (and maybe some of the older section) and see what's in bloom (or leaf) in late summer. Meet at the Pearl's parking lot on Hwy. 41-A for this easy walk on an unpaved trail.

All times are CDT.

Wear appropriate shoes on all of these walks. Risks involved in hiking include physical exertion, rough terrain, forces of nature, and other hazards not present in everyday life. Picking flowers and digging plants are prohibited in all of the above-mentioned natural areas.

For more information on these or other Sewanee Herbarium events, please contact Yolande Gottfried at the Herbarium (931.598.3346) or by email at ygottfri@sewanee.edu. Directions are available on the Herbarium website, lal.sewanee.edu/herbarium/, under the calendar of events.



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Plant drawings, by Mary Priestley, are of trumpet creeper, flowering dogwood, mayapple, Canada hemlock, and an American chestnut seedling.

Friends of the Sewanee Herbarium

The Friends of the Sewanee Herbarium support the work of the Herbarium: education, research, and conservation. A $10.00 annual contribution would be very much appreciated. The date of your most recent contribution is printed on your address label.

Name and Address (if different from that on the mailing label on the back):

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Please mail checks (made payable to "Sewanee: The University of the South") to:

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Drawing Lessons from Nature

A generous gift in memory of Sewanee artist and nature journaler Mary McCleaf is helping to underwrite a two-day mixed media botanical art and nature journaling workshop that the herbarium is sponsoring this summer. The workshop, titled Drawing Lessons from Nature, is scheduled for August 10, 11, 9 a.m. to 3 p.m., and will be limited to 15 participants. The cost is $75 per person, due at registration.

Lendon Noe, the workshop instructor, was Professor of Art at Lambuth University in Jackson, TN, for 28 years and is now partner and instructor with Silver Creek Workshops. For the past 10 years, her work has been focused on natural history.

Workshop participants do not need to have had experience in botanical art or nature journaling. According to Lendon, "We will begin with the simplest materials and learn specific techniques for focusing attention and drawing from nature. Weather permitting, we will go into the landscape both days (no arduous hiking) and learn to see and record our surroundings. We will come back to the studio and enhance our pages. We will profit from the study of the collection of the Herbarium at Sewanee. As we close, we will finish a remarkably personal record of our stay."

For more information or to register for the workshop, contact Mary Priestley at marypriestley@bellsouth.net or 931-598-0157. Participants will receive a list of suggested supplies when they register, but no particular materials are required.

Mary McCleaf and her husband David Clough retired to Sewanee, where she died in 2010. The nature journaling group currently sponsored by the Sewanee Herbarium is an outgrowth of the Dead Plants Society, of which Mary was an active member.

— MPP

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